IVV 09-4: Project Management

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Purpose

The purpose of this system level procedure (SLP) is to establish a consistent and documented method of performing project management for the IV&V Office. Supplemental information can be found in the Project Management Guidebook.

Scope

This SLP applies to all IV&V Office personnel who perform project management for IV&V or system/software engineering tasks for the NASA IV&V Program.

Definitions and Acronyms

Official NASA IV&V roles and terms are defined in the Quality Manual. Specialized definitions identified in this SLP are defined below.

- **Business Manager** (BM)
  - Within the scope of this SLP, the BM monitors the financial resources for the IV&V Office and coordinates with contracting and program financial management personnel to enable the planning, mechanization, and execution of IVVO work. The BM coordinates with Project Managers (PMs) to roll up financial resource requirements for IV&V activities from the project level to the office level, monitors IVVO financial performance at the office level, serves as a resource to the PMs in their review of contractor financial deliverables, and provides support to PMs or Group Leads with respect to financial planning and performance as appropriate or requested.
- **Deliverable**
  - A deliverable is a product identified as a deliverable within task orders, contracts, or IV&V Project Execution Plans (IPEPs). Products required by a task order or contract may be known as formal deliverables; other products may be known as informal deliverables.
- **IV&V Office Management**
  - IV&V Office Management is the managing body of NASA IV&V civil service employees that includes the IV&V Office Lead, the IV&V Office Business Manager, and the IV&V Office Group Leads, (IV&V, CD, TQ&E, JSTAR, and SWAT), and other leads as assigned by the IVVO Lead.
- **Milestone**
  - A milestone is an event in the lifecycle of a project that is generally denoted by a formal, project-led review, with IV&V participation (e.g., Preliminary Design Review, where entrance and exit criteria and review board are defined). For more information about milestone reviews and related guidance for the software engineering community: SW Engineering Handbook -- 7.9 - Entrance and Exit Criteria
- **Project Artifacts**

- Project Artifacts are the products, documents, and information delivered to the NASA IV&V Program for use in performing IV&V activities on a project.

Acronyms

BM	Business Manager
CAR	Corrective Action Request
CD	Capability Development
COR	Contracting Officer Representative
ECM	Enterprise Content Management
FA	Formal Agreement
FRR	Flight Readiness Review
IBA	IV&V Board of Advisors
IPEP	IV&V Project Execution Plan
IVVO	IV&V Office
JSTAR	Jon McBride Software Testing and Research
NODIS	NASA Online Directives Information System
NPR	NASA Procedural Requirements
PAR	Preventative Action Request
PBRA	Portfolio Based Risk Assessment
PFM	Program Financial Management
PM	Project Manager
PMER	Performance Monitor Evaluation Report
POC	Point of Contact
QM	Quality Manual
RBA	Risk Based Assessment
RRB	Risk Review Board
SBU	Sensitive But Unclassified
SLP	System Level Procedure
SMSR	Safety and Mission Success Review
SWAT	Software Assurance Tools
TIM	Technical Issue Memorandum
TM	Task Monitor
TQ&E	Technical Quality and Excellence

Procedure Flow Diagram

The following diagram depicts procedures described in this document, and the responsibilities and actions that shall be performed by participants or their designees. Any information supplemental to the depicted procedure will appear after the diagram.

Project Lifecycle

Initiation
- Assignments Made
- Mission Contacts
- IV&V Heritage Review

{Applicable IV&V Products from past identified & Set of Resources Acquired}

Planning
- Scope and Technical Rigor Established
- Resource Needs, Schedule Developed
- IPEP (WBS instantiated, Scope, Schedule)

{Plan Not Acceptable}

{Plan Acceptable & All Resources Acquired}

{Scope Change Mission Schedule Change Recommendation to Replan}

Execution
- Execute Schedule,
- Maintain Scope &
- Deliver products
- Manage Knowledge

{Recommendations}

{Scheduled Review}

Review
- Review of schedule, approaches, knowledge

{End of project schedule mission cancelled}
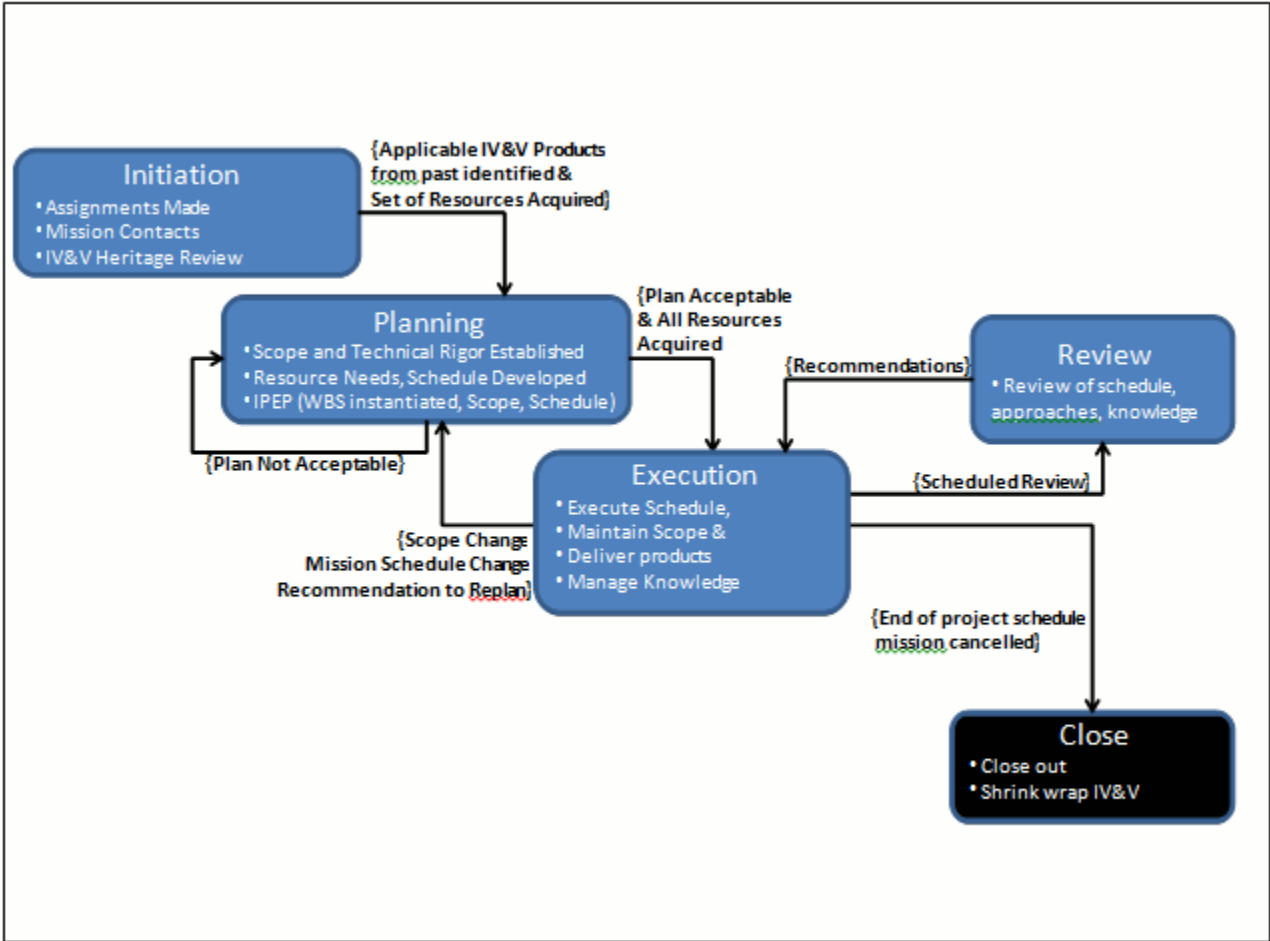
Close
- Close out
- Shrink wrap IV&V

Table 4.1

Table 4-1 -- 02-01-2018.doc

An IV&V Project will go through five potentially overlapping states that comprise the project lifecycle: Initiation, Planning, Execution, Review, and Close. The scope of the IV&V efforts will be determined by the Portfolio Based Risk Assessment (PBRA) process conducted prior to the Initialization state. (Information regarding the PBRA process can be found in S3106, *PBRA and RBA Process*.) Through all phases of the lifecycle the PM will follow IV V 16, *Control of Records*.

> During the lifecycle of the project, any risks, Lessons Learned, and Success Stories should be compiled. The IV&V Office will provide a status of project risks to the Risk Review Board (RRB) on a monthly basis.

Project Initiation

For IV&V Project Initiation, the IV&V Office shall assign a Project Manager (PM) and a core set of IV&V Analysts to a new project. The PM shall initiate communications with the Project to provide an overview of IV&V, acquire a project schedule, and establish objectives. The PM will then conduct a heritage review to identify relevant products and artifacts from heritage projects that may be applicable to the current project.

Project Planning

During the planning state, the PM shall work with the Technical Quality and Excellence (TQ&E) Group to establish the scope and technical rigor of the IV&V effort to be applied. During the Project Planning state, the IV&V PM establishes the Assurance Strategy for the IV&V Project which encapsulates the goals, objectives, and Assurance Statements that the IV&V project plans to accomplish throughout its lifecycle.

The PM shall develop a Formal Agreement (FA) that will document and communicate to the customer the planned technical and management approaches that will be used in the execution of the IV&V Project. The IV&V Project Execution Plan (IPEP) will serve as that formal agreement for all IV&V Board of Advisors (IBA)-funded IV&V Projects. For non-IBA-funded IV&V Projects, an IPEP, Memorandum of Agreement, or other formally documented contractual agreement may serve as the FA; the type of agreement that is used for this kind of IV&V Project will be determined through collaboration with the customer.

(Information regarding IPEP preparation can be found in T2103, *IPEP Template*; and additional information can be found in IVV 09-1, *Independent Verification and Validation Technical Framework*.)

The FA shall include, but is not limited to, the following information:

- Purpose
- Customer contact information
- IV&V Team and customer communication approach
- Roles and responsibilities
- IV&V goals and objectives
- Technical approach
- Project schedule reference
- Issue resolution protocol
- Resource requirements

When an FA is developed, the PM shall provide a draft to the IV&V Office Lead and the TQ&E Group for collaboration toward a shared agreement. The FA shall be approved by IV&V Office Lead. The PM shall provide the FA to the customer for concurrence. Where there is a lack of agreement between parties, the IV&V Office Lead will have authority for resolution. The PM shall review the FA every 6 months and update the FA as necessary. The PM will work with the IV&V Office BM to refine resource requirements for the project.

Project Execution

During the Execution state, the PM shall monitor and manage the IV&V schedule, budget, risks, issues, and communications, of the IV&V Project, to include all product deliveries specific to the project. The PM shall support the BM's evaluation of IV&V Project resource allocations, utilization, and out-month staffing plans. The BM will also make the Contracting Officer Representative (COR) and IVVO Lead aware of any financial issues or discrepancies identified. The BM and PMs are performing contract management Task Monitor (TM) responsibilities when inspecting/evaluating formal deliverables and providing Performance Monitor Evaluation Reports (PMER) to the COR. For any IV&V Project for which there is a contractor PM, the IV&V Office will designate a civil servant representative who will be responsible for the above tasks.

Deliverable Processing

Control of Customer-Supplied Products, Product Identification, and Traceability

The PM shall ensure that appropriate Project Artifacts (e.g., documents, code, databases) are used when performing tasks and that they are identified in any resulting report/output (e.g., version, date). In addition, the PM shall identify and ensure adherence to any privacy- and/or security-related requirements associated with customer-supplied products, which includes NASA Export Control Regulations and Sensitive But Unclassified (SBU).

Inspection of Product

The BM/PM shall objectively evaluate all IV&V Products before submission to the customer (e.g. Development Project). If the product is required by a contract or task order (i.e., if it is a formal deliverable) then acceptance or rejection notification will be provided to the COR within 10 working days. If rejected, the BM/PM will also provide issues of discrepancy to the COR. The BM/PM shall objectively evaluate such products for quality using applicable criteria including, but not limited to, those identified in the contract and/or task order requirements.

For any IV&V Project for which there is a contractor PM, the IV&V Office designated civil servant representative will be designated as the person responsible for evaluating products required by a contract or task order (i.e., formal deliverables). The designated civil servant shall evaluate the product and provide acceptance or rejection notification to the COR within the allotted 10-day period. If rejected, the designated civil servant and/or PM will also provide issues of discrepancy to the COR.

The BM will provide acceptance or rejection of Contractor Financial Management Reports (533s), on behalf of the PM, working collaboratively with the PM to ensure accuracy of data reported specific to their respective project.

Deliverable Distribution

Control of Nonconforming Product

If the NASA IV&V Program identifies a problem with an IV&V Product that has already been delivered to the customer, the PM shall immediately inform the Point of Contact (POC) of the problem. If the customer identifies a product produced by the NASA IV&V Program as nonconforming (e.g., in an inappropriate format or performed on the wrong project artifact), the PM shall resolve the issue with the customer.

Regardless of how the problem has been identified, the PM shall:

- Complete a Corrective Action Request (CAR) per IVV 14, *Corrective and Preventive Action*
- Ensure that the problem is resolved and that the customer is provided a full explanation of events
- Request closure of the CAR once the nonconforming product has been approved and sent to the customer

The nonconforming product shall be subjected to its established verification process once the nonconforming product has been corrected.

Product Review and Approval Process

The PM shall submit IV&V Products that are delivered to the customer for review and approval to ensure quality of the products. Review and approval must be acquired prior to delivery to the customer.

The products identified in the following table require usage of Form 1007, Concurrence Sheet, for review and approval. Concurrence Sheets will be maintained as objective evidence of the review and approval process. The PM shall file the Concurrence Sheet with electronic signatures in the specific project folder on ECM. Refer to IVV 16, Control of Records, for further guidance.

Customer Deliverable Products Requiring Form 1007, Concurrence Sheet			
Product	**Originator**	**Reviewers**	**Approver**
Safety and Mission Success Review (SMSR)	PM	IV&V Office Management	NASA IV&V Director
Flight Readiness Review (FRR)	PM	IV&V Office Management	NASA IV&V Director
(Initial) IBA-funded Formal Agreements (IPEP)	PM	TQ&E Group, IV&V Office Management	IV&V Office Lead
(Initial) Non-IBA-funded Formal Agreements (IPEP, other agreements)	PM	TQ&E Group, IV&V Office Management, PFM Group, COR	NASA IV&V Director
(Revised) Formal Agreements (all)	PM	IV&V Office Management	IV&V Office Lead

Table 4.4.2.2-1

The following products do not utilize Form 1007, but still require review and approval prior to delivery to the customer. The review and approval authority for these products are outlined in the below table.

- Severity 1 and 2 Technical Issue Memorandums (TIMs) - are approved in the Resolve tool by TQ&E personnel who are in the Resolve approval chain.
- IV&V Technical Reports - the PM shall indicate on the cover of the report that the report was "Approved by [the appropriate PM]," and the report shall be stored in the Enterprise Content Management (ECM) System in the specific project deliverable folder.
- IV&V presentations for customer project milestone reviews - the review and approval process by the IV&V Office Lead will be captured by utilizing ECM capabilities (e.g., Make Generation or Work Flow capabilities).
  - For more information about milestone reviews and related guidance for the software engineering community: SW Engineering Handbook -- 7.9 - Entrance and Exit Criteria

Customer Deliverable Products Not Requiring Form 1007, Concurrence Sheet			
Product	**Originator**	**Reviewers**	**Approver**
Severity 1 and 2 TIMs	IV&V Project Team	PM	TQ&E Group or IV&V Office Management
IV&V Technical Reports	IV&V Project Team	None	PM
IV&V Presentations for Customer Project Milestone Reviews	PM	None	IV&V Office Lead

Table 4.4.2.2-2

Contractor Performance Evaluation

The BM/PM, as Task Monitors for the IV&V Project he/she is assigned to, is required to prepare and submit a Performance Monitor Evaluation Report (PMER) to the COR as outlined in the contract Performance Evaluation Plan.

For any IV&V Project for which there is a contractor PM, a civil servant representative will be designated as the performance monitor for that IV&V Project. The designated civil servant shall prepare and submit the PMER to the COR semi-annually as outlined in the contract Performance Evaluation Plan.

Project Review

The Project Review state is entered when an IV&V Project undergoes a review by the IV&V Office Management or TQ&E Group. The PM identifies these reviews in the planning state and incorporates them into the IV&V Project schedule. The PM will work with the IV&V Office Management and the TQ&E Group to understand and incorporate any recommendations that the TQ&E Group provides as a result of these Project Reviews.

Project Close

The IV&V Project will enter the Project Close state when planned analysis is complete or the IV&V Project is cancelled. Once an IV&V Project enters the Close state, the PM shall ensure that the following closeout activities are completed:

- All records and project artifacts shall be saved/archived on ECM in the specific project folder. This includes records generated in tools (Klocwork, Resolve, etc.) or other servers (Poros, etc.). The archival process consists of discussing with IT/SWAT how the information will be made available in the future to ensure accessibility/compatibility. Per Federal requirements, all records must be electronic (no physical records will be maintained). Any physical records (including binders, DVDs, etc.) shall be digitalized and saved on ECM in the project folder. . If you need assistance with the digitalization process, please coordinate with the NASA IV&V Records Team. Once all artifacts and records have been saved on ECM in the project folder, the Records Team shall be notified so that they can coordinate the close out of the project folder. This includes renaming the folder and changing the permissions to "Read Only." For additional details see S3016, *Reference Guide for Controlling Records at Project Closeout*.
- All Lessons Learned and Success Stories are documented per IVV 23, *Lessons Learned* and Organizational Learning, and IVV 24, *Success Stories*.

For a more detailed checklist of all project closeout activities see Project Closeout Checklist.

Metrics

Any metrics associated with this SLP are established and tracked within the NASA IV&V Metrics Program.

Records

The following records will be generated or updated and filed in accordance with this SLP and IVV 16, *Control of Records*, and in reference to NASA Procedural Requirements (NPR) 1441.1, *NASA Records Management Program Requirements*.

Record Name	Original	Essential	Responsible Person	Retention Requirement	Location
FA signed by customer	Y	N	PM	Refer to File Plan	ECM System
Concurrence Sheet for associated FA submitted to customer	Y	N	PM	Refer to File Plan	ECM System
Concurrence Sheet for FA annual review	Y	N	PM	Refer to File Plan	ECM System
Customer Products (e.g., Technical Reports, Severity 1 and 2 TIMs, Milestone Reviews)	Y	N	PM	Refer to File Plan	ECM System or Resolve (for TIMs)
Concurrence Sheet for review of IV&V presentations at a SMSR or FRR	Y	N	PM	Refer to File Plan	ECM System

References

REFERENCES	
Document ID/Link	**Document Title**
Form 1007	Concurrence Sheet
IVV QM	NASA IV&V Quality Manual
IVV 09-1	Independent Verification and Validation Technical Framework
IVV 14	Corrective and Preventive Action
IVV 16	Control of Records
IVV 23	Lessons Learned
IVV 24	Success Stories
NPR 1441.1	NASA Records Management Program Requirements
S3016	Reference Guide for Controlling Records at Project Closeout
S3106	Portfolio Based Risk Assessment (PBRA) and Risk Based Assessment (RBA) Process
T2103	IV&V Project Execution Plan (IPEP) Template
PM Guidebook	Project Management Guidebook

If any procedure, method, or step in this document conflicts with any document in the NASA Online Directives Information System (NODIS), this document shall be superseded by the NODIS document. Any external reference shall be monitored by the Document Owner for current versioning.

Version History

VERSION HISTORY				
Version	**Description of Change**	**Rationale for Change**	**Author**	**Effective Date**
Basic	Initial Release		Greg Blaney IT /387	1/30 /1998
A - AA	Older revision information may be located in the Version History Overflow Document		Various	04/07 /1998 - 08/31 /2010
AB	Removed MOA references. Editorial: "Final" to "Flight".		Jerry Sims	12/8 /2010
AC	Updated Records Table to include all products mentioned in Section 4.4.2.2. Updated Project Close to allow changing folder permissions		Jerry Sims	3/31 /2011
AD	Clarify review and approval of customer deliverables and filing expectations		Natalie Alvaro	6/28 /2011
AE	Add contractor PM. Clarify Task Monitor responsibilities of the RM and PM		Eric Sylvania	12/1 /2011
AF	Updated sections 3.5 and 4.4 to clarify duties and to change the title of Resource Manager to Business Manager and fix resulting acronym changes throughout.	PAR 2013-P-385. Reduce risk of misunderstanding regarding division of responsibilities: if/ when the Business Manager will consult or inform the Project Manager, etc.	Steve Raque	5/2/2013

AG	Updates throughout document to incorporate recent changes to IVVO processes. Changed expectations for review of the Formal Agreements (FA) to every 6 months. Add reference to S3016, …*Records at Project Closeout.* COTR to COR.	CAR 2014-C-398. FA: To ensure consistency between IV&V and project plans and execution. S3016: ensure records and their ideas are handled properly. COR: follow FAR regulation.	Wes Deadrick	6/24/2014
AH	Update the reviewers/approver for (Revised) Formal Agreements.	Once a project is established, we don't have to require PFM, TQE, PCM, and OOD to review the IPEP each and every year and sign the concurrence sheet. The funding sheet review/approval and the TO SOW mod review/approval will still be done and we will still be able to see what the planned work is and the $ associated with it. The only thing that will change is you (PFM, TQE, PCM, and OOD) won't be required to review the IPEP appendices. The IPEP content will still obviously be available if you want to review it.	Wes Deadrick	2/1/2018
AI	Updates Product Review and Approval Process, Project Close, and Records Table sections	Form 1007 is now electronic, eliminates process for physical records and filing systems due to Federal regulations, Adds information related to the archival process of data during project closeout, Emphasizes that all project records should be saved on ECM, Updates retention period of records to refer to the File Plan to eliminate 2 separate sources of information.	Stephanie King	11/19/2021